VITALDRIVE LTD

2023

TECHNICAL SPECIFICATION

For the supply of Transformer Testing Van TransLAB-5

Larnaca, Cyprus

TALDRIVE LTD

Holding company "EMZ"
Head office and Factory:
Aradippou Industrial and Commercial Estate,
Larnaca, Cyprus
RN HE 132211; IN 9.84

Transformer Test Van
TRANSLAB-5

During commissioning and operation, it is essential that your power transformer is in good condition. Various negative influences such as overload, moisture, short-circuit stresses, switching surges can impact the expected lifetime throughout a transformer's lifecycle. Regularly performing a range of standard electrical tests has proven an effective way to gain a reliable insight into the operating condition of your transformers and can extend their lifespan. Mechanical changes to windings, contact problems in the tap changer or at other connections, shorted windings/coils, as well as interruptions or short-circuit of parallel lines can all be diagnosed early by using conventional testing methods. Severe and costly damage can be thereby prevented with the use of the Transformer Test VanTransLAB-5.

The transformer test van **TransLAB-5** performs several conventional testing methods such as:

- Three Phase Transformer Turns Ratio (TTR) Measurements
- Transformer DC Winding Resistance Measurements
- Dynamic Resistance Measurements (DRM) – OLTC Verification
- Short-circuit Impedance / Leakage Reactance Measurements
- Exciting Current Measurements
- Insulation Resistance Measurements

Optional electrical tests (included upon request)- see 'optional' section

- Automatic Tangent Delta and Capacity Measurements
- Frequency Domain Spectroscopy (FDS) Measurements

With the help of our transformer test van TransLAB-5 you can easily carry out work on transformers and determine all their parameters. After testing is complete, the power transformer can also be safely demagnetized.

Phone:+35724821788 E-mail: salevd@vitaldrive.net
Fax: + 357 24821787 Website: www.vitaldrive.net

View of TransLAB-5

A. MAIN EQUIPMENT

1. Central Control Operating Unit

The entire operation control of the mobile transformer test van is performed from the operator area. Direct access to equipment interface is granted via a sophisticated touch screen panel computer.
The integrated equipment is ergonomically installed in the test van in order to make it esthetic appealing as well as functional to maintain. TransLAB is a modular system and the operator can perform many more tests by using additional modules which can be installed inside. A transparent separation wall allows the user to have complete and continuous visibility of the technical area. All operation modes, techniques and safety control are fully integrated in the system and permit the following:

- safety system control: door locks, internal/external emergency stop buttons, safety key switch, step voltage control - ground to vehicle chassis, external safety box, overvoltage and over current protection;
- control and visual identification that the system is connected properly to the mains supply;
- selection of operating modes via changeover safety switch;
- electrical power control of the equipment

TransLAB-5 Operating Units

1.1 Electrical Module

The main electrical module is designed to supply power to the transformer test van. Protection devices are installed to protect against over currents and earth leakage currents. Digital indicator meters are also installed and display the input voltage, load current and frequency of the supply network. The sophisticated, practical, and efficient TransLAB design guarantees the efficient and safe operation of all systems.

View of Electrical Module and Digital Indicators

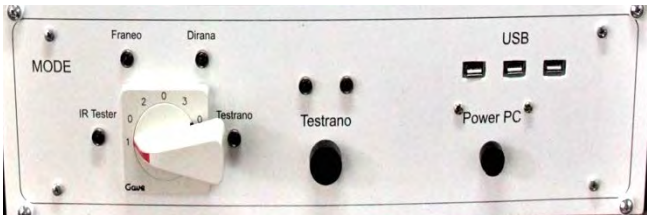
1.2 Control and Safety Module

The control and safety module is designed to provide power control, internal lighting control and visual inspection of the test van safety system. A safety key switch ensures that only authorized personnel can energize the testing equipment.

View of Control and Safety Module

1.3 Mode and Computer Module

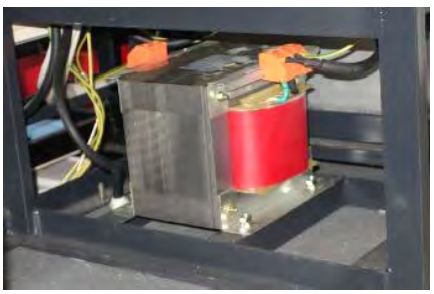
The mode/computer module is designed to select safely the various testing modes and to provide interface/access to the industrial panel computer.



View of Mode and Computer Module

1.4 Isolation Transformer

A single-phase isolation transformer is used to provide galvanic isolation to the transformer test van. The isolation transformer not only enhances the electrical safety of the system, but it also helps to reduce potential voltage spikes, switching transients and noise.



View of Isolation Transformer

Technical parameters:

- Input voltage 230 V ±10%
- Power Capacity 7KVA
- Applicable Frequency 50/60Hz
- Work Efficiency ≥98%

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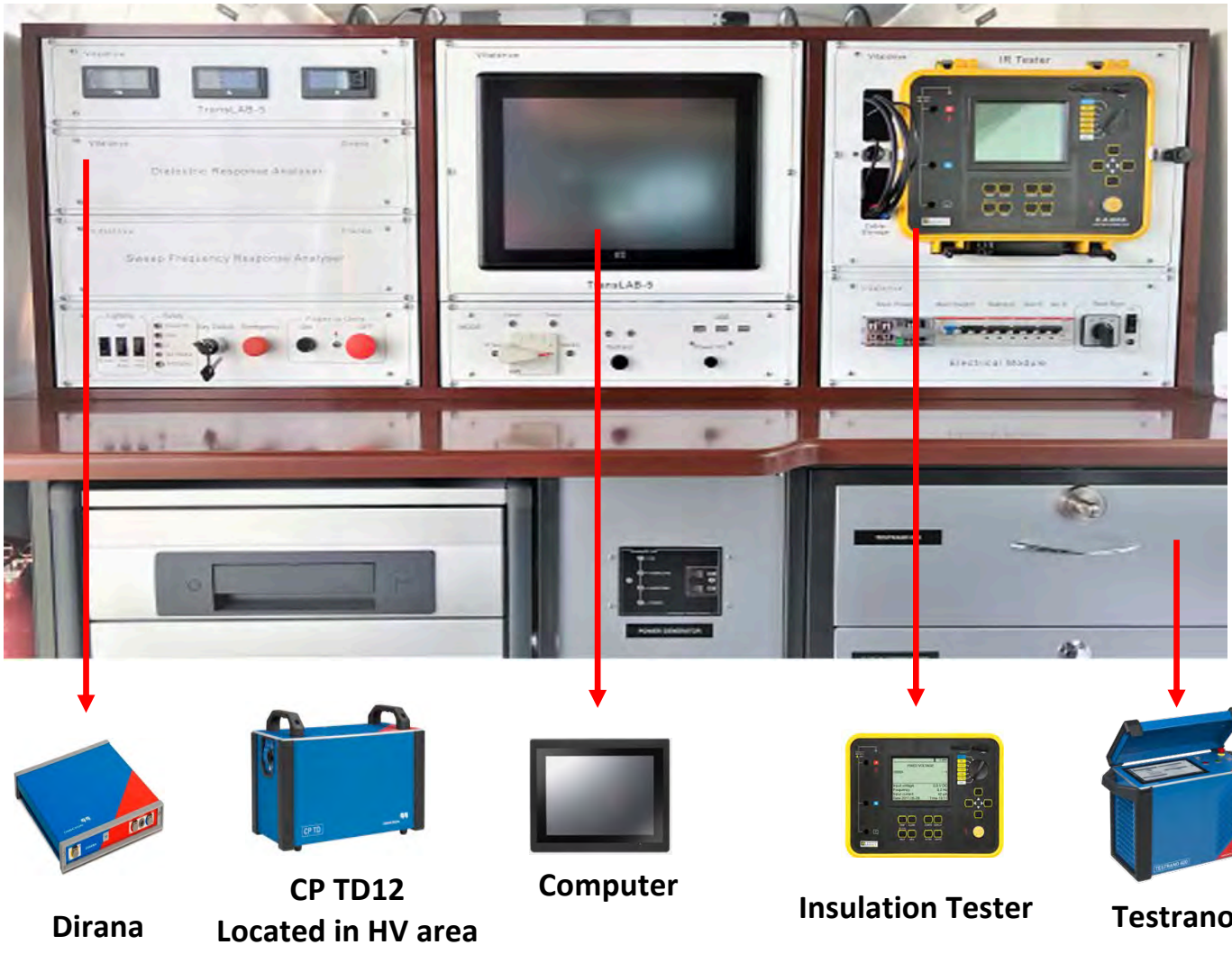

View of the Operator area (*image for reference)

The touch screen panel computer allows the interaction with all the installed equipment in the transformer test van. The installed Primary Test Manager (PTM) software assists the operators in testing and assessing their assets in accordance with applicable international IEEE and IEC standards and guidelines, while keeping testing time to a minimum. All test and assessment results are automatically stored in a structured and easily accessible database. The software automatically generates reports including all asset-related information and performed tests. This provides a comprehensive overview of the test object, test results and assessment. The operators can easily adapt test reports, for example, by choosing from different types of result tables and diagrams and by providing comments on every test. Furthermore, it is possible to incorporate company logos, photos and other test results. The reports can easily be exported in Microsoft Word, Microsoft Excel and PDF format.

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2. TESTRANO 600 Multi-Functional Three-Phase Test System

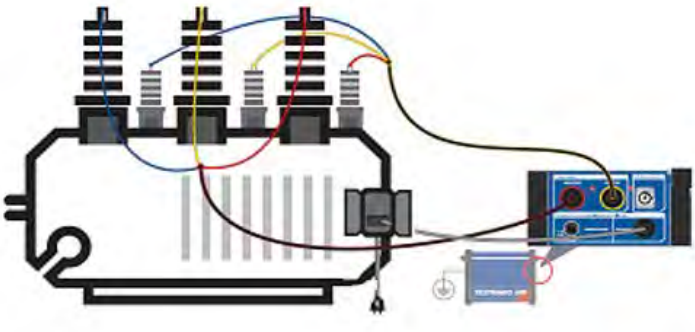
TESTRANO 600 is the most advanced, three-phase test system which supports all common electrical tests on power transformers. Compared to conventional single-phase test sets the three-phase capabilities of the unit offer several advantages such as: one setup can be used to perform various tests, the rewiring effort is significantly reduced, testing time can be cut down to a third of the time, increased safety as less trips up and down are needed.

The TESTRANO 600 provides you with a convenient way of testing to gain a comprehensive insight into the condition of every part of your power transformer. It can be operated using TESTRANO TouchControl on the integrated display, or by using the Primary Testing ManagerTM software on a computer. This makes it ideal for routine and diagnostic testing on site or during factory acceptance tests (FAT).

* Primary Testing ManagerTM software

* Primary Testing ManagerTM customized reporting

Results are automatically stored and organized in the database on your PC and are available for analysis and reporting. Each test can be automatically assessed according to international standards and guidelines or based on your individual limit values. The measurement result can be visualized in tables and plots for easy review and assessment. Additionally, they can be compared with previous results and historical trends, allowing further in-depth analysis.



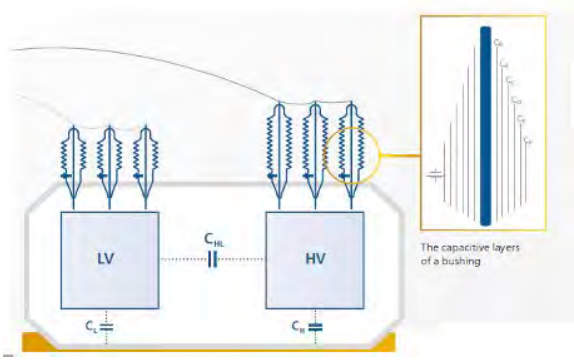
*Connection sequence of the Testrano600 to the transformer

Features:

- True three-phase power transformer test set
- Powerful device with 3 x 33 A DC or 400 V AC
- Reduced wiring effort as same wiring can be used for different tests
- Automatic tap changer control and measurement, no accessory required
- Fast and reliable demagnetization of transformer's core

3. CP TD Capacitance/Dissipation Factor Testing Device (Tan Delta) – Optional

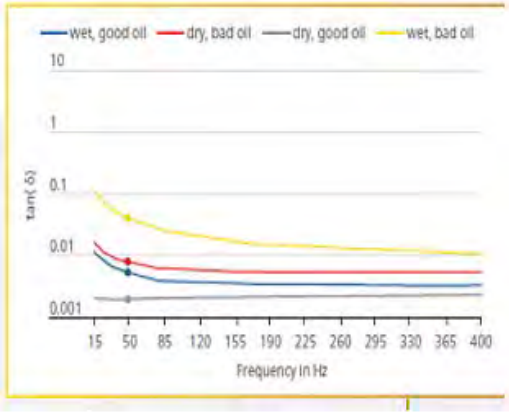
The CP TD accessory is used in combination with TESTRANO 600 to perform automatic tan delta and capacitance measurements. The unit enables the user to perform power/dissipation factor and capacitance measurements from 15 Hz to 400 Hz. This frequency sweep increases the sensitivity of the test and helps the user to better assess the insulation condition and detect defects at an early stage. The CP TD includes a high-voltage source, reference capacitor and measurement electronics. It can generate output voltages up to 12 KV, currents up to 300 mA and achieves laboratory precision, even in environments with strong interferences.



* Capacitance and power factor/dissipation factor measurements

* CP TD Tan Delta and TESTRANO 600 optional transport case with wheels

* CP TD1 Tan Delta settings view



* Tan Delta measurements of four different transformers below and above line frequency 50 Hz

Features:

- Testing at variable frequencies for better condition diagnosis
- Excellent suppression of mains frequency interference fields
- Wider frequency range for more sensitivity (15 Hz to 400 Hz)

4. Dirana FDS – PDC Dielectric Response Analyzer – Optional

For power transformers, the moisture content is one of the most important parameters determining the remaining lifetime. Moisture in oil-paper insulated power and instrument transformers is caused by paper aging or enters the transformer via leaky seals or breathing. It leads to a reduced breakdown strength and an accelerated aging of the insulation.

DIRANA determines the water content in paper without the need of oil sampling. It combines Frequency Domain Spectroscopy (FDS) and Polarization Depolarization Current (PDC+). In combination with the automated frequency range setting, DIRANA ensures the shortest measurement time on all assets at any temperature. The easy-to-use software provides automatic analysis and requires no expert knowledge. The measurement results are shown in categories defined by IEC 60422.

Features:

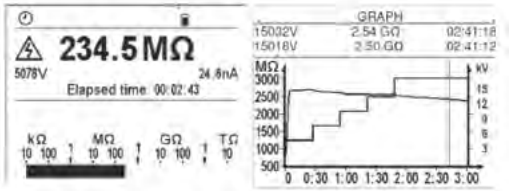
- Non-invasive moisture determination in the paper insulation
- Automated software for easy analysis without expert knowledge
- Shortest measurement time by combination of revolutionary FDS and PDC+ and automatic frequency range determination
- Applicable to all oil-paper or ester-paper insulated assets

5. C.A 6550 Insulation Tester

With its test voltage of up to 10 kV, the C.A 6550 megohm-meter is an expert tool for testing insulation safely and accurately. It complies with the most recent recommended practice while taking into account future developments. The multiple test modes mean that you can both assess the insulation in qualitative terms by non-destructive testing ("I-limit" and "early-break" modes) and use samples to investigate insulation ageing problems for preventive maintenance purposes ("burning" mode).

* C.A 6550 Insulation Tester

The C.A 6550 offers quick, effective checking of test execution by displaying the evolution of the test in progress in graphic form. Thanks to its large storage capacity, complete analysis of the test sessions performed on-site can be carried out with the DataView software after transferring the data onto a PC.



* C.A 6555 Graphic Display

Technical Specification

Test Voltages	**Ranges**	500V: 10 kΩ to 2 TΩ 1000V: 10 kΩ to 4 TΩ 2500V: 10 kΩ to 10 TΩ 5000V: 10 kΩ to 15 TΩ 10000V: 10 kΩ to 25 TΩ
	Fixed Test Voltages	500, 1000, 2500, 5000, 10000
	Variable Test Voltages	40V – 10000V, 3 presettable voltage values
	Adjustment Increment for Variable Voltages	Variable:40-10KV Step: 40V-1KV:10V 1KV-10KV:100V

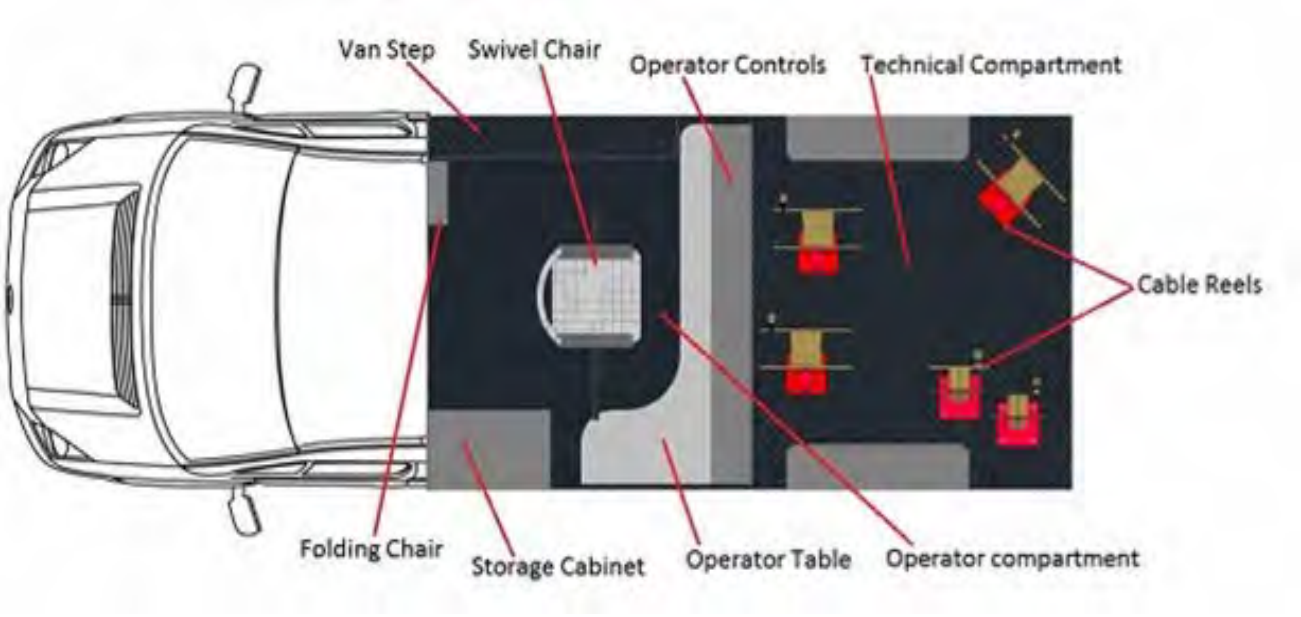
Features:

- Wide measurement range
- Fixed or programmable test voltage from 40V to 10 KV
- 5mA max. charging current
- Automation ratio calculation
- Multiple test modes
- 3 filters to optimize measurement stability
- Calculation of R at a reference temperature
- Optically-isolated USB communication for transfer onto PC and report generation with DataView software

B. CONNECTING DEVICES

External connections for the transformer test van are provided with a power feeding cable drum, a grounding cable drum.
Standard cable drums for measurements are also provided for each device.

- Drum with main power cable, 2 x 2.5 mm2, cable length 50 m
- Drum with grounding cable with a cross-section 16 mm2 copper transparent plastic sheath with connection every 4 to 5 m, cable length 50 m
- Drum with tap changer cable, cable length 30 m
- Drums for connections of ALL equipment: cable length 30 m
- Auxiliary FU ground cable, cable length 15m



***Design is representative; it can change according to project specifications and manufacturer's choice**

C. ELECTRICAL SAFETY SYSTEM

4. Electrical Safety System

Safety when operating the test van is of paramount importance. Therefore, throughout the design, manufacturing and testing stages the safety elements are constantly evaluated and checked to ensure that the operator can work in a comfortable environment.

The electrical safety system provides protection to the operating personnel as follows:

- monitoring the potential on the car (switching off if the potential is higher than 24V)
- monitoring the door of the high voltage compartment (switching off the equipment if doors are opened)
- Emergency switch to shut down the equipment in case of hazard
- Visible break load switch
- Automatic discharge and earthing switch
- Beacon and warning siren
- Plexiglas partition panel between HV cabin and operating cabin

D. PROTECTIVE EQUIPMENT

5. Voltage Detector

Voltage Detectors are used to verify live or de-energized conductors. These testers may be used with rubber insulating gloves or hot sticks using the splined universal end fitting. Testers indicate the presence of voltage with an extra bright LED light and a distinctive audible signal. It is recommended that the tester be moved closer to conductor until warning is indicated, or it touches conductor, apparatus, or test point. Test the unit on a nearby energized conductor.

* HV Detector

6. Personnel Protective Equipment / Tool Kit

1	Ground pole / Insulating stick	1 unit
2	Dielectric gloves	2 pair
3	Dielectric boots	1 pair
4	Protective helmet	2 units
5	Tool kit	1 unit
6	Fire extinguisher	1 unit
7	Reflecting triangle	1 unit
8	Ground spike	1 unit
9	Hammer	1 unit

* Electrical Insulating Gloves

E. AUXILIARY GENERATOR

7. Engine Mounted Auxiliary Generator

Where connection to the national grid is not possible, then the engine mounted generator is the system to help. By utilizing the vehicle engine as the primary energy source, the generator is a light weight, simple to operate, efficient and reliable system for generating AC power in mobile applications. As the system is not dependent on batteries, the system can generate its rated power all day, with no reduction in performance or efficiency.

* Engine Mounted Generator

Features:

- Continuously rated – generate power all day with no need to refuel
- Light weight – typically 87% lower than a generator, increasing available payload
- Less space requirement – typically 98% less volume than a generator
- Low engine revs (typically 1250 rpm) to reduce fuel consumption and clean exhaust emissions
- CE marked and fully EMC compliant

F. VEHICLE

8. Chassis: Mercedes Sprinter

High performer and workhorse – the Sprinter is more than a vehicle: it's a true partner you can always rely on to support you all the way when there's a job to be done. It is known above all for its outstanding operational reliability which gives users the freedom to concentrate fully on their business activities. It is the result of the process of continuous development with which ensures that the Sprinter always offers the best in terms of reliability, quality, safety, flexibility, cost effectiveness, sustainability, and service

9. Vehicle Body Work

The test van is designed to be easy to operate and service. It is equipped with high quality insulated wall paneling and air conditioning. The body is divided into technical and operator compartments separated by a partition wall. The interior of the laboratory has a Roof Mounted Air conditioner with both cooling and heating of air.

View of the Control Panel *(*image for reference only)*

View of drawer installation for TESTRANO 600 *(*image for reference)*

The monoblock air conditioner is designed to be installed on the roofs of the environmental analysis laboratory. Special care has been taken to ensure low noise both inside and outside. The system features a high efficiency heat pump which supplies more than double the heating power for the power supplied. By activating the AUTO function, the air conditioner selects the most suitable ventilation speed and the cooling or heating function automatically. It comes with a remote control with a programmable timer and ON/OFF switch for the diffuser light.

The extra flat diffuser has a sloping profile on all four sides and has direction adjustable front and rear air outlets (horizontal and vertical). The unit is suitable for tropical climates up to 55 oC and has an anti-freeze protection. It comes with a remote control with a programmable timer and ON/OFF switch for the diffuser light. The extra flat diffuser has a sloping profile on all four sides and has direction adjustable front and rear air outlets (horizontal and vertical).

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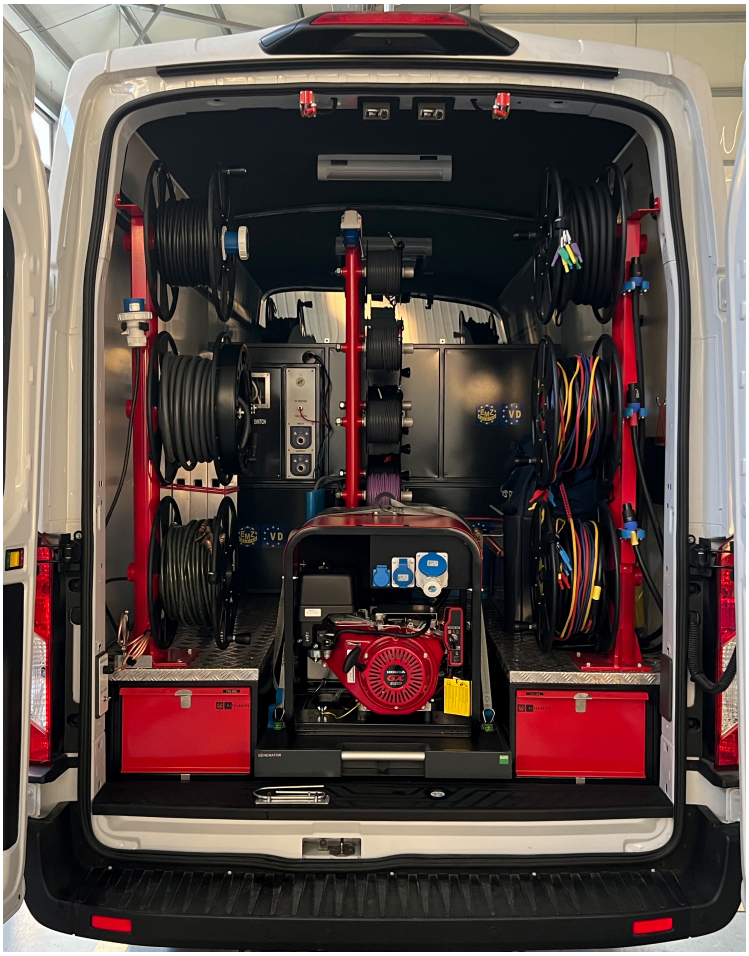

* including portable generator

View of the High Voltage area *(*image for reference)*

The technical area compartment includes all the necessary tools and equipment for carrying out testing and inspections. Safety is an important feature of the test vans and hence all equipment is properly mounted and secured for transit.

Features:

- Roof mounted air conditioner
- Internal lighting 230 VAC & 12VDC
- Insulated walls and roof for thermal and noise
- Special antistatic floor in operator area
- Partition wall, Operating desk & Swivel chair
- Drawers for storage of accessories

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View of accessories in the Operator area *(*image for reference)*

View of protective equipment *(*image for reference)*

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Dedicated storage space for equipment and tools.

View of the Transformer Test Van on-site *(*image for reference)*

H. OPERATING CONDITIONS

Test Vans are designed for operation at temperatures up to + 40 ° C, relative humidity up to 80% and atmospheric pressure 630-800 mm Hg. The lower temperature limit is not limited, provided that the temperature inside the test van is not lower than 1 ° C above zero.